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Assessment of Knowledge and Attitudes of Fire Safety – An Institution Based Study

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Abstract

Introduction:
Fire safety is essential component and requirement in building infrastructure plans and provision of fire safety systems is mandatory even in dental care settings. Knowledge regarding the use of these systems in various instances is essential to all health care workers including dentists, dental students and auxiliaries.

Aim:
To assess the knowledge and attitudes of fire safety among undergraduate, postgraduate dental students and staff in Amrita School of Dentistry and to find any association between education level and knowledge regarding fire safety.

Material and Methods:
A cross sectional study was conducted by distributing a 20 itemed self-administered questionnaire which consisted of 4 dichotomous responses, 6 rating scale responses, 3 multiple responses and 7 open ended questions. Data was analyzed using SPSS version 16.

Results:
A total of 270 participated in the study. Nearly half of the participants have a positive attitude towards fire safety and very few participants knew the way to use fire control measures in case of fire accident.

Conclusion:
There was an appreciably good knowledge about fire safety among dentists and dental students with a positive attitude towards safe practice.

Keywords: attitudes, dentistry, fire, knowledge, safety

INTRODUCTION

Fire is a small word with serious meaning. Most people do not realize the destruction and damage to human life and property a fire can cause. The outbreak of fire pose a significant threat to all persons within a building and it can have serious financial and psychological implications. [1] Given the potentially devastating consequences there is a significant responsibility for the dental practitioners in terms of fire safety and implement precautions as appropriate.

Fire safety is essential component and requirement in building infrastructure plans. Provision of fire safety system like emergency exits, different types of fire extinguishers, safe assemble area, fire hydrant system is mandatory even in dental care settings.

Fires are not uncommon in hospital operating rooms and have also occurred in clinical offices. It is estimated that 600 surgical fires occur yearly in hospitals.[2] Previously few reviews reported the sources of fire in dental care settings and recommended guidelines for fire safety.[3] Knowledge regarding the use of these systems in various instances is essential to all the health care workers including dentists, dental students and auxiliaries.

There are 3 essential elements which cause fire viz. fuel source, sufficient heat to ignition and the presence of oxygen and these 3 are commonly referred to as fire triangle, increasing the risk of fire accidents.[4] Like the epidemiological triad for disease, fire also can be extinguished by removing one of the 3 components. Three basic technique for fire extinguishing include starvation (removing the fuel from the fire), blanketing (by limiting the oxygen supply) and cooling (to remove heat).

Fire can be classified into four types viz.

Class A (fire due to burning of wood, paper, ordinary material)
Class B (due to gasoline and other inflammable liquids)
Class C (due to live electrical equipment)
Class D (due to combustible metals)

To extinguish these four types of fire there are four types of extinguishers viz. water, dry powder, foam and oxygen.

Apart from these, the dental care providers should know the emergency exits and manual call points. Regular fire mock drills have to be conducted to make them aware of fire safety and evacuation procedures. A fire risk assessment should also be done which is basically a structural look at workplace to allow identification of hazards and assessment as to whether existing precautions are satisfactory or need to be updated.

Hence, this study is aimed at determining the awareness and attitudes of various dental personnel in an institute towards fire safety and its control and to find any association between education level and knowledge regarding fire safety.

MATERIALS AND METHODS

A cross sectional study was conducted using a pretested questionnaire among 270 participants from Amrita School of Dentistry which included undergraduate and postgraduate students and teaching staff.

Ethical clearance was obtained from the ethical committee of the institution. Written informed consent was obtained from each of the participants after the purpose of the study was explained.

Subjects present during the time of survey were invited to participate. Questionnaire was distributed to all the students who were present in the class and asked to fill the form in 15 minutes. To the interns, PGs, staff and auxiliaries the questionnaires were distributed at their respective departments. The self-administered questionnaire consisted of 20 items which included demographic data, information on knowledge about risk of fire accidents in dental setup, fire triangle, fire control, safety and prevention methods and their attitude toward fire safety practice.

Regarding the attitude towards fire safety and prevention, the respondents were asked to respond to 4 dichotomous response questions (YES or NO), 6 statements, on a five point Likert scale ranging from "strongly agreed" to "agreed", "no opinion" and "disagree" to "strongly disagreed". For analysis purpose the strongly agree and agree categories were combined to "agree" and disagree and strongly disagree categories combined into "disagree". To assess the knowledge regarding fire triangle, fire safety and control, risk of fire accidents in dental setup, 7 open ended questions and 3 multiple response questions were used. Participants were cluster classified into under Graduates/interns and post-Graduates/staff. The data was analyzed using SPSS version 16. A p-value of <0.05 was considered statistically significant. Chi square/Fisher's exact test was used to find any association between education level and knowledge regarding fire safety.

RESULTS

The study comprised of 47 males and 223 females with age ranged from 18 years to 41. This study included 223 students (175 Undergraduates and 48 Interns) and 47 faculty members/postgraduates (13 faculty members and 34 Postgraduates) of the institution.

Attitude towards fire safety and control

It was found that 7% of the respondents have had personal fire accident experience in the past. 93% agreed that a fire accident can occur in a dental clinic setup (Table - 1).

It was found that 95.6% of the participants believed that Prosthodontics department was at a higher risk for a fire accident to occur and followed by Conservative and Endodontics (2.6%), Oral and Maxillofacial Surgery (1.1%), Oral Medicine and Radiology (0.4%).

More than half of the respondents 98.6% agree that every student should know about things to do and avoid in case of fire emergency and 97% agree that every student should be trained in fire prevention and control.

It was found that 83% of the respondents disagreed that it was a waste of finances investing in fire prevention and control equipment and 95.9% agreed that every clinic should have guidelines for fire prevention and also 92.6% agreed that every clinic should undergo inspections by concerned authorities.

Knowledge about fire safety and control measures

It was found that about 95.6% of the respondents were unaware about any government or private bodies concerned with fire prevention and control guidelines and regulations (Table - 2).

It was found that only about 7% of the respondents were aware of the fire triangle and its components and 4.4% knew about different types of fire. Only 15% of the participants were aware about different types of fire extinguishers and 6.7% knew the "PASS" method of fire control. PASS is an acronym for **P**ull the activation pin. **A**im the nozzle at the base of the fire. **S**queeze the handle to release the extinguishing agent. **S**weep the stream over the base of the fire.

More than half of the respondents (81.5%) preferred to use fire extinguishers to control fire and 89.3% preferred emergency exit route to escape, in case of a fire accident. Only 21.1% of the participants knew the way to do fire risk assessment in a dental clinic.

A total of 47.8 % of the respondents knew emergency contact numbers and more than half of the respondents (80.4%) preferred to shout, call for help and activate fire alarm in case of seeing a fire.

There was no significant association between knowledge of fire safety and education level of the participants. However, significantly higher number of postgraduates and staff than undergraduates expressed that they know recommended fire prevention and control guidelines or regulations ($p=0.039$).

Table 1: Responses of the participants for Questions regarding attitude towards fire safety and control

Question	Agree N (%)	No Opinion N (%)	Disagree N (%)
A fire accident can occur in a dental clinic setup	251 (93)	17 (6.3)	2 (0.8)
Every student should know about do's and don'ts in case of fire emergency	266 (98.6)	3 (1.1)	1 (0.4)
Every student should be trained in fire prevention control	262 (97)	4 (1.5)	4 (1.5)
It is a waste of finances investing in fire prevention and control equipment	16 (5.9)	30 (11.1)	224 (83)
Every clinic should have guidelines for fire prevention	259 (95.9)	9 (3.3)	2 (0.7)
Every clinic should undergo inspections by concerned authorities	250 (92.6)	14 (5.2)	6 (2.2)

Table 2: Responses of the participants for Questions regarding knowledge about fire safety and control

Question	Response	
	Yes N (%)	**No N (%)**
Do you know any international or national or state or local government or private bodies recommended fire prevention and control guidelines or regulations?	12 (4.4)	258 (95.6)
Do you know about fire triangle and its components?	20 (7.4)	250 (92.6)
Do you know about different types of fires?	19 (7)	215 (93)
Do you know about different types of fire extinguishers?	43 (15.9)	227 (84.1)
Do you know about 'PASS' method of fire control?	19 (7)	215 (93)
Do you know how to do risk assessment for fire safety in a dental clinic?	57 (21.1)	213 (78.9)
Do you know any emergency contact numbers?	136 (50.4)	134 (49.6)

Table 3: Association between education level and knowledge regarding fire safety

		UG/intern N (%)	**PG/Staff N (%)**	**p-value**
Do you know any international or national or state or local government or private bodies recommended fire prevention and control guidelines or regulations?	Yes	7 (3.1%)	5 (10.6%)	0.039; Sig
	No	216 (96.9%)	42 (89.4%)	
Do you know about fire triangle and its components?	Yes	13 (5.8%)	7 (14.9%)	0.058; NS
	No	210 (94.2%)	40 (85.1%)	
Do you know about different types of fires?	Yes	16 (7.2%)	3 (6.4%)	>0.99; NS
	No	207 (92.8%)	44 (93.6%)	
Do you know about different types of fire extinguishers?	Yes	34 (15.2%)	9 (19.1%)	0.513; NS
	No	189 (84.8%)	38 (80.9%)	
Do you know about 'PASS' method of fire control?	Yes	14 (6.3%)	5 (10.6%)	0.342; NS
	No	209 (93.7%)	42 (89.4%)	
Do you know how to do risk assessment for fire safety in a dental clinic?	Yes	49 (22.0%)	8 (17.0%)	0.45; NS
	No	174 (78.0%)	39 (83.0%)	
Do you know any emergency contact numbers?	Yes	109 (48.9%)	27 (57.4%)	0.286; NS
	No	114 (51.1%)	20 (42.6%)	

DISCUSSION

The present questionnaire study was carried out among 270 participants from Amrita School of Dentistry to assess the knowledge and attitude of fire safety and to find any association between education level and knowledge regarding fire safety. The majority of the study participants were dental students and females.

In the study, it was found that more than 90% of the subjects believed that prosthodontics department was at a higher risk of fire accidents and this might be attributed to the fact that most of the participants were students and all are exposed to preclinical prosthodontic work which involves the use of Bunsen burners.

Overall, it was found that only nearly half of the participants have a positive attitude towards fire safety and control measures to be followed and installed in a dental clinic.

It was observed that very few study participants knew about the way to use correct fire control measures in case of fire accidents. But more than half of participants knew the correct method to escape and alert people in case of fire accidents.

It is recommended that capacity building orientation programs involving fire safety specifically developed to dentistry should be included in the first year dental curriculum to acclimatize students about the same and much emphasis should be given for regular mock drills.

Every building should have at least two exit routes. It is mandatory to ensure that all corridors, stairways and fire exit doors are kept clear at all times. All buildings should have suitable firefighting equipment located preferably near exit doors. Suitable fire detection systems compromising an automatic manual electric alarm system with break glass call points should be provided. Mock drills should include when to call local emergency numbers like 101 and 108 for rescue operations.

Potential fire hazards within a dental setting is enormous and they include sources of fuel like combustible materials such as latex gloves, mouthwashes, cotton rolls, cloth drapes, waxes, isopropyl alcohol, polymethyl methacrylate, spirit lamp, x-ray films, flammable gas cylinders (eg:

Nitrous oxide), gas pipelines, sources of ignition like Bunsen burners, radiation machines, CBCT scanners, autoclaves, electrocautery and surgery units, light curing units, amalgamators and sources of oxygen like oxygen cylinders, oxidizing chemicals like H_20_2, sodium hypochlorite.

Aqueous solutions like bottled saline, bottled water etc can also be used to put out small fires. A separated bottle labeled "for fire" can also be kept available in emergency. ECRI recommends 5lb CO_2 extinguishers mounted inside just at the entrance of every clinic. Evacuation is rare and if necessary in extreme cases follow the acronym "RACE" i.e., **R**escue patients, **A**lert authorities, **C**onfine fire by closing doors and **E**vacuate the building.

Work environment in dental office is not safe without appropriate fire and safety awareness. Appropriate standards can be achieved by comprehensive risk assessment, implementation of suitable fire precautions and detailed staff training. Mere display of emergency exits and fire extinguishers may not be useful without the basic knowledge about the basic firefighting skills. Such developed skills may be useful later to incorporate into their clinics and other needful areas.

Recommendations –

1. It is recommended to include some content related to fire prevention and control methods and precaution in the dental academic curriculum along with the topics viz., occupational hazards, dental practice management and disaster management.
2. All students and faculty should be made aware of guidelines provided regulatory bodies like NABH (National Accreditation Board for Hospitals and Health care providers), National Disaster Management guidelines for hospital safety, National Building code of India (Fire and Safety) and frequent mock drills should be conducted to reinforce the information.
3. Awareness to students and dentists on legal issues regarding a fire incident while operating on a patient.
4. World Day for Safety and Health at Work can be observed every year on 28th April.

CONCLUSION

Although there was an appreciable level of positive attitude towards fire safety and control amongst the dental students and staff, there were deficits in their knowledge about fire control measures in most areas. The knowledge of the dental profession could be improved by emphasizing on fire control practices.

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